Ceramic Phase Equilibria Database

The goal of this project is to develop and maintain a state-of-the-art database of critically-evaluated ceramic phase equilibria data for industrial and academic customers. It is a collaborative effort between the Ceramics Division and the American Ceramics Society.

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Phase diagrams are used throughout the ceramics industry to understand and control the complex phenomena which underlie advanced industrial production and materials performance. To serve the need for reliable phase diagram data, the Phase Equilibria Data Center along with the American Ceramic Society (ACerS) jointly published a series of critically evaluated collections of phase diagrams. The series originally was published under the title "Phase Diagrams for Ceramists," (1964–1992). It is now published under the more general title "Phase Equilibria Diagrams" to emphasize that the data are useful to the broader materials community.

The "Phase Equilibria Diagrams" series provides current, evaluated data on the phase equilibria of ceramics and related materials, and also provides bibliographic, graphical and analytical services so that researchers have access to reliable up-to-date data for designing, using, applying, analyzing, and selecting those materials. The published portion of the database includes approximately 16,000 entries with nearly 26,000 phase diagrams contained in nineteen books, and a CD-ROM. Over 53,000 units have been sold worldwide. Approximately 1000 new entries are collected from the primary literature each year.

Currently underway is a complete modernization of the 1980's HP-based system to a relational database using PC's. The new system is expected to come on line in 2003 and will be capable of electronic publishing in a variety of formats, including a Web-based version. Much of this year's efforts have involved assisting and working with on-site ACerS staff to design and build the new system, which must incorporate all of the scientific data relationships embodied in the original database. In addition, the NIST-ACerS team has completed the required modernization tasks including upgrading of the digitization software, originally written by NIST staff, and input of 2,000 commentaries and 6,955 diagrams from older volumes of the series that did not exist as electronic files.

The topical volume *"Electronic Ceramics: Oxides of Ti, Nb, and Ta"*, edited by R.S. Roth, is nearing completion and will go to press approximately December 2002 (approximately 800 entries and 1080 diagrams). An example of a phase diagram from this volume is shown in Figure 1. Most of the systems in this monograph will be of major interest to the fields of dielectric, ferroelectric, and piezoelectric ceramics. Following this volume preparation, there will be the publication in early 2003 of a newly updated *"Cumulative Index,"* which will provide comprehensive coverage of published data sorted by chemical system and author. Also in preparation is "*Volume XIV — Oxides"* (spring 2004) which will contain a wide variety of metal, non-metal, and semi-metal oxide systems — more than 900 entries with 1300 diagrams are already available for inclusion. The possibility of a future volume on ceramics for energy applications is currently being explored.

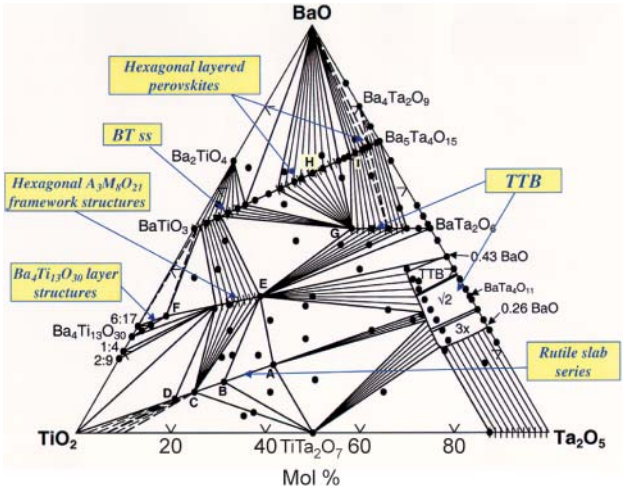

Figure 1: *Recently completed NIST phase diagram for the system BaO:TiO_2:Ta_2O_5, to be included in the upcoming database publication,* "Electronic Ceramics: Oxides of Ti, Nb, and Ta" (available in early 2003, *Am. Ceram. Soc.*).

Contributors and Collaborators

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